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AUTHOR Sorensen, Aage B.
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A MODEL AND A METRIC FOR THE ANALYSIS OF STATUS ATTAINMENT PROCESSES

Aage B. Sørensen

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Aage B. Sørensen

May 1978

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ABSTRACT

This paper proposes a theory of the status attainment process, and specifies it in a mathematical model. The theory justifies a transformation of the conventional status scores to a metric that produces an exponential distribution of attainments, and a transformation of educational attainments to a metric that reflects the competitive advantage conferred by education. The new metric produces theoretically more meaningful results than the old metric when used together with the proposed model in an analysis of change in status; and also performs better statistically with the proposed model, as well as with conventional models for the level of status. An empirical analysis demonstrates that there are less favorable career opportunities for women compared to men and for blacks compared to whites.

A Model and a Metric for the Analysis of Status Attainment Processes

1. INTRODUCTION

Since the 1960s, the favorite dependent variable in attainment research in sociology has been the measure of socioeconomic status constructed by Duncan (1961) or the similar measure of occupational prestige generated by Siegel (1971). The two measures are closely related and produce comparable results; in particular, the metric properties of the scores are identical. The scores are ordinal measures that provide a ranking of occupations. Ironically, the remarkable methodological sophistication of status attainment research has been achieved by treating these ordinal measures as interval level measures in continuous variable models, even though the distribution of the population according to SEI or prestige is not a meaningful concept. With these measures, any transformation of the scores that preserves the rank ordering among occupations is legitimate; that is, SEI or prestige scores are rubber bands. This means that a uniform distribution, a distribution skewed to the right or to the left, or a bell-shaped distribution would be equally meaningful (or meaningless) representations of the distribution of occupational attainments in society. The actual distribution of attainments according to prestige scores is a rather peculiar bimodal distribution with little resemblance to any well-behaved distribution (like the distribution of income).

The ordinality of the SEI and prestige scores means that the effect parameters estimated in status attainment models are arbitrary. Any order preserving transformation is legitimate, but estimated causal effects cannot in general be expected to remain invariant under such transformations.

Much effort has been addressed to estimating the causal effects precisely, but our inferences about the nature of the process are dependent on the particular metric used and the population distribution associated with it. It is, for example, repeatedly reported that there are only minimal differences in the status attainment process for men and women. There are nevertheless important differences in the occupational distribution and earnings of the two sexes. It is conceivable that a transformation of the status scores could produce a different conclusion if the metric distances were increased between occupations where women are typically employed.

There are several solutions to this problem. One is to develop a measurement technique for status that provides at least an interval level metric, and preferably also a zero point. This approach has not received much attention.[1] Apparently, the well-known invariances of the status scores across societies and over time have led to the impression that an excellent metric has been produced by some fluke. But the invariances only reveal that scores obtained in a similar fashion on different populations result in the same rank orderings.

A second approach is to abandon status scores completely, and instead use the recently available powerful techniques for analysis of discrete variables--such as log-linear models--directly on the occupational categories. There seems to be a trend in this direction, but the prestige or "goodness" of occupations seems a legitimate concern. Although log-linear techniques may be adequate for a number of research questions, they force the investigator to use rather few categories for the dependent variable, and the interpretation of the attainment process along some dimension of inequality becomes ambiguous.[2]

The approach used here is straightforward, though perhaps unusual in sociological research. A theory of the attainment process is specified in a mathematical model. The assumption of a particular distribution of attainments is responsible for the simple functional form of the model. The distributional assumption can be fulfilled by choosing a metric for attainments that results in the desired distribution of the population. The SEI and prestige scores are therefore transformed so that the desired distribution obtains. The new scores (referred to as SAS scores, for Status Attainment Scores) thus derive their justification from the proposed theory of the attainment process. A different distributional assumption in this theory would result in different scores, and in a different functional form for the model of the attainment process.

One virtue of the model derived here is its simplicity. Simple models are often automatically assumed to be unrealistic. This may be so for the model proposed here, but it captures important features of observed attainment processes. Empirical support for this model can only be expected if the assumptions of the model are approximated to a reasonable degree. This is impossible if the traditional status metric is used, since the assumption about the distribution of attainments will not then be true. A new metric is necessary for ascertaining the plausibility of the model. The main task of this paper is therefore to show that the model of the attainment process generates plausible results using the new metric, and to show that the new metric is necessary for these results to obtain.

Since any order preserving transformation of status scores is legitimate, it is not possible to evaluate the new metric independently of the proposed theory of attainment. There is no true distribution of attainments to use as a criterion with currently used measures. The close linkage between the theory of attainment and the metric does not preclude, however, the possibility

that the new metric improves the performance of traditional status attainment models. This possibility is also explored.

The new metric, i.e., the SAS scores, is generated using the 1960 U.S. Census Public Use File. These data do not contain information on the respondents' family background, which has been such an important concern in status attainment research. On the other hand, the emphasis here is on the intragenerational attainment process, and the PUS provides information on the 1965 as well as the 1970 occupation. This information on change in status is essential for the analysis with the proposed model.

The main independent variable on which PUS contains information is respondents' education. The theory and the distributional assumption that leads to the generation of a new metric for status also implies measuring educational attainment in a different metric than the traditionally used years of schooling.

The following section outlines the conception of the process of attainment to be adopted. Next a specification of the proposed status attainment model is presented, with a summary of a recent article (Sørensen, 1977) that contains further detail. Section 4 discusses the derivation of the metric for status and for educational attainment, and the last section analyzes empirical results, using the new and the traditional metric with a conventional status attainment model, and then with a model correctly specified according to the proposed theory.

2. THEORIES OF THE ATTAINMENT PROCESS

The observed social and economic attainment of a person at a point in time is the outcome of a change process. Hence a theory of the attainment

process is a theory of how changes in attainment are brought about. The main task in formulating such a theory is to specify a model of the mechanism that generates change. Subsequently this model can be used to estimate the causal influences on change transmitted by the proposed mechanism of change. However, this approach differs from the approach in most status attainment research, which is mainly concerned with estimating the magnitudes of causal influences on the level of attainment rather than on change, and with specifying the temporal and causal interrelationship among variables in simultaneous equation systems (path models). Linear models are used because there seems to be no compelling reason for choosing a more complicated form. In contrast, in this paper the functional form of the observable relationship is derived from the model of change. The parameters have explicit interpretations derived from the model and the theory permits prediction on the magnitudes of these parameters. The commonly used ad hoc models do not permit such interpretation and prediction.

Social and economic attainments are obtained in jobs by persons endowed with personal resources such as a certain level of education, ability skills, and family background. There is an observed association between the resources of individuals and the social and economic attainments they obtain in jobs. The conceptual problem is how this association is created.

One answer to this problem is provided by economics, which views the attainments obtained in jobs as determined by the intersection of the supply of labor by individuals and a demand by firms. Marginal productivity theory predicts earnings of persons as a function of their productivity in combination with prices for output and the costs of other inputs of production. Productivity differences and hence earnings differences reflect ability differences and differences in training and experience.

Human capital theory accounts for training differences and explains unequal earnings as being compensations for training costs.

The economic theory, then, sees earnings as the prices paid to individuals for the quantity and quality of labor supplied. For given demand schedules, earnings for a person will change only if the person's productivity changes. The distribution of earnings hence reflects the distribution of productivities. Since productivity in the main is a question of personal resources, change in these resources must precede change in earnings, and the distribution of attainments must reflect the distribution of resources.

This explains a number of observed features of the earnings attainment process. Since many of these features (e.g., the age-earnings profile, the effect of education) are also observed for other job rewards, such as for occupational status, it is tempting to generalize the theory to account for these rewards. However, there are fundamental conceptual problems in doing so. There is also a growing body of literature that criticizes the neo-classical economic theory of earnings attainment, arguing that the labor market assumed by this theory does not exist, or only exists in parts of the economy (Doeringer and Piore, 1971; Thurow, 1975). I first discuss the difficulties of generalizing the earnings attainment theory to the status attainment process, and then briefly indicate the implications of these difficulties for the marginal productivity/human capital theory of earnings.

The prestige scores that are used to measure the dependent variable in status attainment research, either directly or indirectly in the form of SEI scores, result from rankings of occupations. It has been convincingly argued by Goldthorpe and Hope (1972) that what is being measured is the

goodness of occupations, not prestige in the sense of deference--a relational concept. There is an impressive amount of evidence that these ratings of goodness are stable and quite uniformly agreed upon. The ratings pertain to occupations, but there seems no compelling reason for believing that ratings in terms of goodness could not be equally well performed using ways of identifying jobs other than by occupational titles. The prestige and SEI ratings are interpreted here simply as rankings of the goodness of jobs.

Status rankings conceived of this way are attributes of jobs, not of individuals. In order to change status, an individual must change jobs (or in rare cases the job could be reclassified). This simple fact has important implications. A theory of how change in status attainment is brought about must be a theory of job mobility. In contrast, the marginal productivity/human capital theory of earnings need not be concerned with job mobility since earnings are conceived of as attributes of individuals, not of their jobs. Earnings are assumed to vary within and between jobs, and the concept of jobs is in fact ignored in this theory.

A "neoclassical" theory of status attainment would predict that the status obtained in jobs at any moment is tied to the productivity of the individual. This implies that the status of jobs offered new employees can be made to vary according to fluctuations in supply and demand. Hence employers would be able to create jobs in response to changes in the skills and training of persons. Further, as the productivity of individuals changes, they would be assigned new jobs providing the appropriate status level. This implies that employers can reassign people to jobs whenever a change in productivity is noticed. Such a system assumes that the employment

relationship is such that employees have no control over the decision to leave the job, so that a job assignment can be terminated at any moment, regardless of the wishes of the incumbent.

If the creation of new jobs tends not to reflect changes in the quality and quantity of labor supplied, but rather to reflect shifts in demand, technological change, and change in the modes of production, and if employees only get access to new jobs when the present incumbents of those jobs leave voluntarily, then the neoclassical scenario for status attainment will not apply. Rather individuals will be able to obtain a certain level of status only when a job providing this level is vacant. The vacancy reflects the fact that the previous incumbent has left for another job or for retirement, or that a new job has been created. There is no necessary relation between the creation of vacancies in this manner and changes in the productivity of persons. Hence changes in status may occur without preceding changes in the resources of persons, just as changes in the resources of persons may not lead to a change in status if no better job is available.

Changes in status in such a system can only occur when a vacancy is created. Individual resources determine who gets access to vacancies. This process for change in status is referred to as vacancy competition. A person experiences an increase in status if he/she can get access to a vacancy at a higher level. The resources of one person relative to the resources of other candidates for the job opening determine his/her probability of getting access. In contrast, in the marginal productivity/human capital theory, absolute, not relative, levels of resources determine the level of attainment, and only change in resources produces change in attainments.

This has important implications for the treatment of variables measuring resources, particularly education, and an attempt is made in this paper to measure educational attainment in a manner that is consistent with this notion of competitive advantage.[4]

The vacancy competition model is consistent with an assumption of the creation and elimination of jobs being exogeneous to changes in the distribution of personal resources. This, of course, is the assumption usually made by sociologists in the study of social mobility, where the distribution of positions in society among which moves are made is taken for granted. It seems a much more satisfactory assumption than the one necessitated by a "neoclassical" theory of status attainment, which would assume that the distribution of jobs according to attainment levels is endogenous to the distribution of personal resources.

In order to link the creation of vacancies to the movement of people and hence change in status it is necessary to assume a particular distribution of jobs according to attainment level. This assumption provides the desired metric for status. The distributional assumption and the specification of the vacancy competition model for change in status are described in the next section.

It should be noted that the vacancy competition model may also be applied to earnings attainments. The vacancy competition model assumes that employees cannot be dismissed (except in extreme circumstances) from their jobs. The employment relationship is hence closed to competition from the outside. This makes it difficult for employers to tie a wage rate to the productivity of employees. Therefore, it is likely that earnings become a characteristic of jobs, not of people (cf. Thurow, 1975),

and that the marginal productivity/human capital theory will not apply to the earnings determination processes. The implications of this are discussed by Thurow (1975) and by Sørensen and Kalleberg (1977); however, since my concern is for the status attainment process, the point is not elaborated here.

3. SPECIFICATION OF THE VACANCY COMPETITION MODEL

The objective is to formulate a model for the status attainment process in which changes in status are brought about by job mobility. Mobility should only occur when a job is vacant, either because it is a new job, or because the previous incumbent has left for another job or for retirement. Chains of mobility would occur across status levels as the move of one person creates opportunities for moves by other persons (cf. White, 1970). The model should link such chains of moves to the status changes of persons and the personal resources (education, etc.) that determine their ability to get access to vacant jobs. In order to link job mobility and status change it is necessary to assume a distribution of jobs according to status level. A particularly simple functional form for the desired model of the status attainment process can be derived assuming that the distribution of jobs according to status is exponential. If y denotes the status level provided by a job, that is, the goodness of the job, the assumed distribution has probability density

$$f(y) = -e^{\beta y} \qquad \beta < 0 \tag{1}$$

and distribution function

$$F(y) = \Pr(y \leq y) = 1 - e^{\beta y'}. \tag{1a}$$

The distribution is governed by a single parameter β assumed to be less than zero. It describes a pyramidical structure of inequality in society, where the density of jobs is highest at the bottom level of status [$f(0) = -\beta$] and decreases as y increases. The quantity β may be said to govern the shape of the distribution of status. The proportion of jobs providing a status greater than a certain level y' would be smaller the larger β is in absolute magnitude. The proportion of jobs that are better than the one currently occupied by a person represents possible opportunities for gains in status. Hence β is one of the two quantities that govern the opportunity structure of society: the other is the rate at which better jobs become vacant.

The main reason for choosing the exponential distribution is that it leads to a particularly simple functional form for the desired model for the status attainment process. However, the choice is not without precedent in the literature. The exponential distribution is the continuous variable analogue to the geometric distributions that would apply if status had been measured as a discrete variable. The geometric distribution has been suggested as a representation of the structure of inequality (Simon, 1957; Bartholomew, 1973; Svalastoga, 1973; Stinchcombe, 1974). Bartholomew has shown that if this distribution is assumed for an organization, a particularly simple promotion scheme will prevail--a property to be used here.

Further, Lydall (1959) has shown that in the case of the geometric distribution the Pareto distribution of incomes may be obtained assuming that the logs of incomes are linearly related to attainment level. This argument is easily generalized to continuous y. It is well known that the Pareto

distribution described the upper tails of the observed income distribution in detail, but not the bottom. However, this does not imply that the exponential model cannot be assumed to describe the status distribution; it is used here to describe the distribution of jobs, not of persons. Jobs may be vacant or filled: The distribution of jobs according to status need not correspond to the distribution of personal incomes that include persons out of the labor force, and does not include the attainment level provided by vacant jobs. In any event, due to the ordinal nature of existing status measures, there is no way of deciding the empirical validity of an exponential distribution of status because no one has seen this distribution.

Status change for individuals in such a system occurs as people move from jobs at one status level to jobs at another status level. The structure of inequality is assumed stable over time. People enter and leave the structure when they enter and leave the labor force, and when they leave the labor force, they leave vacant jobs. These jobs are filled either by new recruits or by people moving from other jobs into the vacated jobs. Following White (1970) two types of moves may be conceived of: (1) moves by people from filled jobs to vacant jobs, thereby creating new vacancies to be filled by others in the system or entering the system, and (2) moves by vacancies in the opposite direction of the moves by individuals. Chains of moves by persons start when a person enters the labor force and end with retirement (temporary moves out of the labor force are ignored here). Chains of moves by vacancies start with the creation of a vacancy due to retirement (or the creation of a new job) and end by the elimination of a vacancy by a person from outside the system (or by elimination of the job).

If we focus only on voluntary moves and assume that individuals maximize status, then the rate at which vacancies arrive at a certain level of attainment will give the rate at which people at this level can increase their status by moving to better jobs. Denote the number of jobs at level y by n(y), the number of vacancies arriving at level y by m(y), and the total number of jobs in the system by N. Assume that the new vacancies not immediately filled by new entrants to the labor market are created at a constant rate h at every status level. It can be shown (Sørensen, 1977: 970-971) that

$$m(y) = h \int_y^{\infty} n(u)du, \tag{2}$$

that is, the number of vacancies arriving at y is the sum of new vacancies created at higher levels. Denote the rate at which opportunities for better jobs will arrive at y by q(y): $q(y) = m(y)/n(y)$. But $n(y) = Nf(y)$, with f(y) defined in Equation 1; carrying out the integration in Equation 2 gives $m(y) = hNe^{\beta y}$. Hence

$$q(y) = \frac{nNe^{\beta y}}{N[-\beta e^{\beta y}]} = -\frac{h}{\beta}. \tag{3}$$

It follows that at all levels of status q(y) will be the same or $q(y) = q$ for all y. The quantity qdt is the probability that a person will realize a gain in status in dt. The derivation shows that this quantity is a function of h, the rate at which new vacancies are created by people leaving the labor force, and new jobs, and of β, which governs the shape of the status distribution by determining the proportion of jobs that provide a higher

level of attainment. The result is a direct consequence of assuming an exponential distribution of status. If some other distribution was assumed, q would be dependent on y and a much more complicated analysis would have to be undertaken.

The quantity q is defined on jobs, not on people. Although everyone at a given status level is exposed to the same q, they are not equally likely to take advantage of it. The extent to which a person is able to take advantage of opportunities for gains in status should be a function of individual resources. We need to specify a model for how an individual's status changes over time as a function of these resources.

The relationship between time, individual resources, and gains in status can be established by assuming that resources are formed at the time of entry into the labor force and remain constant over time. Of course, this is the exact opposite of the assumption made in marginal productivity/human capital theory, where resources are assumed to change over time in the labor force to produce growth in attainments. The assumption of constant resources made here is consistent with the notion of no necessary relation between change in status and change in personal resources in vacancy competition. Assume further that there is some status level y(m) that is the maximum an individual can hope to get access to. Now, every voluntary job shift should produce a gain in status, assuming individuals maximize status. The more shifts an individual has already undertaken, the closer his/her status should be to y(m), and fewer of the opportunities for gains in status presented to the individual can be utilized. It follows that the rate of voluntary shifts, that is, the rate of gain in status, should decline with time in the labor force.

Denote as r(y,t) the rate of shift for an individual at status level y who has spent t years in the labor force. All individuals at a given status level are exposed to the same overall rate q at which opportunities for better jobs are made available. In each period the individual rates should sum to the overall rate. It follows that

$$\int_0^\infty r(y,t) = q = -\frac{h}{\beta}, \qquad (4)$$

where the integration runs over values of t so that $t \to \infty$ as the rate of leaving the current status level becomes zero for persons with status commensurate with their resources. The index y may be dropped from r(y,t) as this quantity is independent of y. Further, it simplifies things later on to define a quantity $b = \beta/h$, so that $q = -1/b$. It was argued before that the rate of shift should decline with time in the labor force. The monotonically decreasing function for r(t) that will satisfy Equation 4 is $r(t) = e^{bt}$.[5] This expression gives the individual rate of job shift, that is, increases in status, as a function of (1) time in the labor force, and (2) b, which measures the opportunity structure determined by the shape of the distribution of attainments and the rate at which new vacancies are created.

Integrating r(t) over time will give the number of shifts a person has undertaken by time t. Denote this quantity v(t). Since $r(t) = e^{bt}$,

$$v(t) = \int_0^t r(u)du = \frac{1}{b}(e^{bt} - 1), \qquad (5)$$

with a maximum value for v(t) that will be $v(\infty) = -1/b$, representing the expected number of shifts a person will undertake in his/her lifetime.

A person will start out with a level of status y(0) at entry into the labor force. By time t the status of this person will equal y(0) plus a

gain equal to the average gain per shift times the number of shifts; that is,

$$y(t) = y(0) + \Delta y \cdot v(t), \tag{6}$$

where Δy is the average gain per shift. This average gain will equal the total gain to be made, that is, $y(m) - y(0)$ divided by the number of shifts, $v(\infty)$. Hence

$$\Delta y = \frac{y(m) - y(0)}{v(\infty)} \tag{7}$$

$$= - b(y(m) - y(0)).$$

Inserting Equation 7 into Equation 6 gives this for the career curve:

$$y(t) = y(0) + \frac{1}{b} (e^{bt} - 1)[-b(y(m) - y(0))]. \tag{8}$$

The quantity $y(m)$ is a function of both the person's individual resources and the opportunity structure; that is, how far a person will go up in the distribution of status depends both on his/her personal characteristics and on the opportunity structure. It is useful to introduce a measure of personal resources that is independent of the opportunity structure, defined by the relation

$$\frac{dz}{dy(m)} = - b, \tag{9}$$

where z is a comprehensive measure of the resources. With this definition, Equation 8 can be written (after some rearrangement) as

$$y(t) = \frac{z}{b}(e^{bt} - 1) + y(0)e^{bt}. \tag{10}$$

This is, then, the desired expression for the status attainment process that relates status at time t to the opportunity structure (measured by b), the individual's resources (measured by z), and the status at entry into the labor force.[6] It describes a career curve that is concave to the time axis. Such patterns have repeatedly been observed (see for example Mincer, 1974, for earnings attainment and Sørensen, 1975a, for status attainments). A comprehensive measure of resources is not available in empirical investigations; however, one can write z as a function of measured resource variables such as education, measures of family background, etc. Assuming that the specific resources add up to the overall level of resources, a linear formulation is appropriate. Thus, denoting the measures of specific resources by x_i, the expression

$$z = c_0 + \sum_i c_i x_i \qquad (11)$$

may be substituted in Equation 10. Using data on change in status, Equation 10 may be estimated and the parameters c_i, which measure the contribution of specific resources to the overall level of resources, as well as b, which measure of opportunity structure, can be ascertained. This task is carried out later in the paper. First it is necessary to establish the appropriate metric for the status attainment variables.

4. DERIVING METRICS FOR STATUS AND EDUCATION

The model in Equation 10 is derived assuming an exponential distribution of status. Existing measures of status are ordinal. Hence any order preserving transformation is appropriate. In particular, there is no reason

not to transform existing scores to a metric that produces the distribution of status assumed in the derivation of the vacancy competition model of the status attainment process. The transformation of existing scores to give the desired distribution may be obtained by computing the cumulative percentile distribution from the old scores. According to the assumed distribution of status, this cumulative distribution should conform to the distribution function

$$F(y) = 1 - e^{\beta y}. \tag{12}$$

In a single population the parameter β may be assumed equal to -1 without loss of generality. Define a quantity $P(y) = 1 - F(y)$. $P(y)$ is $Pr(y > y')$, that is, it gives the proportion of jobs higher than a certain level y'. This quantity may be computed using the conventional status scores, assuming they represent an ordinal transformation of the y scores. Since $\beta = -1$, the desired metric may be obtained by solving for y to give $y = -\log P(y)$. These are the desired SAS scores.

The SAS scores were obtained using the Public Use Sample of the 1970 Census. A 10% random sample from the one-in-a-hundred sample was selected. For those employed in 1970, occupations were coded using the Duncan SEI scores and the Siegel NORC scores. Using both sets of scores cumulative percentiles were obtained, cumulating from the top score down. These percentile scores correspond to F(y). It should be noted that the theory outlined above assumes a distribution of jobs according to status, not of persons. For this reason each observation was weighted using number of hours worked in the week preceding the Census interview. Ideally the status

scores of vacant jobs should also have been used in computing P(y), but this is clearly not possible. Two SAS scores were then obtained: one set based on Duncan SEI, and one set based on Siegel NORC.

The PUS is also used in the following analysis. The main variable measuring a person's resources in these data is respondent's education, measured in years of schooling. The metric provided by years of schooling can be justified in a human capital model of the attainment process. Here attainment differences should be proportional to training costs. The major component of training costs are earnings foregone, which may be assumed roughly proportional to years of schooling. This rationale is lacking in the vacancy competition model. Here what matters for attainment is a person's resources relative to the resources of other candidates for a job vacancy. This means that in the vacancy competition model years of schooling can only be considered an ordinal metric. Any transformation preserving order is again legitimate. The definition of resources given in Equation 9 suggests transforming education attainment into a metric that produces a distribution of the same form as the distribution of attainments.[7] Such a transformation will provide a metric in which a measure of the competitive advantage is conferred to a person by a certain level of educational attainment.

There has been quite a dramatic growth in educational attainments of the U.S. population in this century. The specification of the vacancy competition model just given suggests that people compete mainly with members of their own cohort for access to jobs. Since the distribution of education by years of schooling varies with cohort, the desired transformation of educational attainments should be carried out by cohort. Further, the cohort should be

indexed by year of graduation, rather than by year of birth, since graduation cohorts, not birth cohorts, enter the labor force at the same time.

The desired metric for educational attainment, referred to as EDR, was obtained from the PUS of individuals who left school in 1970 or earlier. Year of graduation was computed by subtracting from 1970 a quantity LFX defined as AGE-EDY-3, where AGE is age in 1970, and EDY is educational attainment measured in years of schooling as given in PUS (starting with nursery school). Three- and five-year cohorts were formed (for the periods 1959-1970 and 1914-1958 respectively). In each of these cohorts the cumulative percentile distribution of educational attainment was obtained, and from these the educational attainment scores (EDR), in the same way as the SAS scores. Since the educational attainment distribution in years of schooling is quite lumpy, the EDR scores used were obtained by interpolating to the midpoints of the assumed metric. Total population estimates were used without correction for differential mortality by education and for differential lifetime participation in the labor force.

A first impression of the differences between the conventional and the new metrics for status and education is given in Table 1, where the intercorrelations between the various measures are presented. The correlation between the status scores in the conventional and the new metric--between SEI and SASA and NORC and SASB--are high: .92 and .95. Using zero-order correlations as a criterion--and this has been the usual criterion in these matters--there seems to be little difference between the new and the conventional metric; but this only confirms that correlations are robust to ordinal transformations (Labowitz, 1970). The high correlations between the new and the old metric do not preclude the fact that quite different inferences

Table 1

Correlations between Status Attainment Variables in New and Conventional Metrics: White Males Employed in 1970, Aged 20-64 (N=28653)

	SEI	NORC	SASA	SASB	EDY	EDR
SEI		.864	.918	.821	.552	.600
NORC			.845	.950	.506	.588
SASA				.884	.535	.625
SASB					.518	.633
EDY						.849
EDR						

Note: SEI is the Duncan Socioeconomic Index; NORC is the Siegel Prestige Scores; SASA is the SAS scores based on SEI; SASB is the SAS scores based on NORC; EDY is education measured in years of schooling; and EDR is education measured as competitive advantage (see text).

may be drawn from estimating status attainment models in different metrics, as the remainder of the paper shows. However, already the correlations between status and education in the new and the old metric indicate that something different is going on. The SAS/EDR correlations are substantially higher than the SEI-NORC/EDY correlations, particularly the NORC/EDY correlations compared to the SASB/EDR correlation (.51 versus .63). This could be interpreted to reflect not the metric properties of the scores but the fact that EDR may be seen as incorporating labor force experience in the measure. This would imply that the SEI-NORC/EDR correlations were of the same magnitude as the SAS/EDR correlations. They are in fact somewhat smaller, indicating that the construction of the EDR scores by standardizing within each graduation cohort (that is, colinear with labor force experience) does not completely account for the improved performance of the new metric. This issue is explored further in the next section.

It should be noted that whether the SAS scores are based on the rankings provided by SEI or the NORC rankings makes almost no difference for the correlation between SAS and EDR. Featherman and Hauser (1976a) compared SEI and NORC scores by standardizing them to the same percentile distribution in order to obtain equal variances in the two scores. They argue that with equal distributions the differences in correlations observed with the two scores are due to differences in what the two scores measure. Since the Duncan SEI performed better they conclude that SEI is a better measure of the "socio-economic dimension" along which the attainment process takes place. The conclusion from the results presented in Table 1 is that it would make no difference whether one uses SEI or NORC scores as long as one transforms these scores to produce an appropriate distribution.

There seems to be very little difference in what the two measures capture. However, the PUS gives no information on family background variables and a final conclusion regarding the issue raised by Featherman and Hauser therefore cannot be reached.

The computations for the tables in the remainder of the paper have been carried out with SAS scores based both on SEI and NORC rankings of occupations. Virtually no difference in results was observed. Since presentation of results pertaining to both sets of scores is redundant, only the ones based on SEI are given in the tables that follow.

5. EMPIRICAL RESULTS

Conventional Status Attainment Model

The differences produced by the two metrics are first explored using a conventional status attainment model of the form

$$y = d_0 + \sum_i d_i x_i, \qquad (13)$$

where y in cross-sectional data (such as those used here) is the current status of the respondent and the x_i variables are measures of individual resources. Little attention has been focussed in the literature on the justification of this model (though Blau and Duncan, 1967, did provide a test of the linear form). It can, however, be derived both from a human capital theory of the attainment process and from the vacancy competition model.

From the human capital perspective, Equation 13 is an appropriate specification of the functional form since levels of attainment are seen

as exclusively determined by a person's resources; however, the set of x_i variables should include labor force experience omitted in most status attainment research (with the recent exception of the work by Bielby, Hauser, and Featherman, 1977). Labor force experience is a proxy for additions to a person's resources. A main source of increase in resources after entry into the labor market is on-the-job training (cf. Becker, 1964). It is argued that the rate of investment in such training declines with time in the labor force (as there will be less time left to recapture the training costs). This argument is used to account for the observed attainment curves that are concave to the time axis. Hence experience should be introduced into Equation 13 in such a way that the curvilinear relation between experience and attainment is captured (cf. Mincer, 1974). Finally, in the human capital interpretaion, education should be measured by years of schooling.

Equation 13 can also be derived from the vacancy competition model, as specified above, by letting $t \to \infty$ in Equation 10. With the linear form of the dependency of z on resource variables given in Equation 11,

$$y(m) = -\frac{c_0}{b} - \sum_i \frac{c_i}{b} x_i. \qquad (14)$$

If the d_i's of Equation 13 are defined as $d_i = -c_i/b$, and since $b < 0$ by assumption, Equation 14 is identical to Equation 13. However, the identity only holds for $t \to \infty$ in the vacancy competition model; that is, for Equation 13 to describe the outcome of a vacancy competition process it must be assumed that y is the highest status level a person obtains. This will not be the case for the current status observed for a cross-sectional sample of persons, particularly the younger respondents. For those, d_i does not

estimate $-c_i/g$ but some quantity that is a function of time in the labor force, b, c_i, and the omitted y(0) since Equation 10 then governs y. On a cross-sectional sample, Equation 13 is therefore likely a misspecification of the reduced form of vacancy competition model.

It is important to note that estimation of Equation 13 does not permit the identification of the forces that govern the attainment process in the vacancy competition model. That is, estimated d_i's do not allow one to obtain separate estimates of the quantity b, which measures the opportunity structure, and c_i which measure the contribution of a variable to a person's resources. Also the inclusion of labor force experience as an x_i variable is a misspecification of the vacancy competition model, where resources are assumed constant for a person after entry into the labor force. Time does enter the vacancy competition model (cf. Equation 10), but not additively.

Equation 13 is estimated below using education and labor force experience as x_i variables in the new and the conventional metrics. This may then be seen as a comparison of a human capital model with a misspecified vacancy competition model. However, the ad hoc use of Equation 13 is likely to continue, and it is of interest to explore whether the metrics make a difference in the conventional model. The use of labor force experience as an independent variable is, as mentioned, not conventional in status attainment research; nevertheless, the results presented above provide a good argument for including this variable when the conventional metric is used.

Equation 13 was estimated for four population groups: black males, black females, white females, and white males. There has been a considerable interest in the race and sex interactions in the status attainment process,

and it is important to explore whether these interactions are similar in the new and the old metrics. Labor force experience is measured as described before, that is, LFX = AGE - EDY - 3, but this is evidently a poor variable for women. Labor force experience squared is entered to capture the expected curvilinearity in the relation between experience and age. The omitted family background variables of course bias the estimates of the effect of education. This is, however, less important with the objectives of the present analysis, and there is much evidence that the bias is not very serious. The results in the SEI/EDY metric and the SAS/EDR metric are presented in Table 2.

The bottom panel of Table 2 presents the mean status and education for the four groups in the two metrics. The attainments of blacks are substantially lower than the attainments of whites in both metrics. However, the inequality in status appears somewhat larger in the SAS metric, and is much larger with respect to educational attainments in the EDR metric than when educational attainment is measured in years of schooling. When the competitive advantage conferred by a level of education is measured, the two year difference between black and white males translates into the educational attainment of blacks being only half that of whites.

White women do slightly worse than white men with respect to status as measured by SAS, and employed women also have a slightly lower educational attainment than men measured by EDR. In contrast, mean status measured by SEI is slightly higher for white women that for white males. Black women do substantially better than black men, but still substantially worse than whites.

Table 2

Regression Analysis of Current Status on Education and Experience in the SEI/EDY Metric and SAS/EDR Metric: White Men and Women and Black Men and Women, Aged 20-64 in 1970

(Metric Coefficients and Standardized Coefficients in Parentheses)

	White Males		White Females		Black Males		Black Females	
	SEI	SAS	SEI	SAS	SEI	SAS	SEI	SAS
Education (EDY/EDR)	4.449 (.622)	.593 (.617)	4.046 (.541)	.458 (.541)	2.421 (.497)	.475 (.560)	3.557 (.541)	.525 (.587)
Experience (LFX)	.581 (.339)	.012 (.153)	.080 (.054)	-.002 (-.041)	-.050 (-.039)	-.002 (-.038)	-.488 (-.315)	-.012 (-.236)
Experience Squared	-.006 (-.185)	-.0003 (-.195)	-.002 (-.008)	-.0001 (-.083)	.003 (.126)	-.0002 (-.021)	.009 (.288)	.0001 (.075)
Constant	-30.701	.291	-16.468	.566	-5.457	.240	-12.177	.401
R^2	.328	.394	.274	.318	.203	.331	.313	.406
Mean Status	40.217	1.030	41.643	.927	24.074	.460	28.000	.555
Mean Education	13.935	1.135	13.963	1.039	11.720	.583	12.673	.712
N	28653		18986		19493		18012	

Note: Blacks and whites were sampled with unequal probabilities from the one-in-a-hundred PUS file to achieve comparable cell sizes.

The regression results presented in Table 2 were obtained using ordinary least squares. The extreme skewness of the SAS and EDR variables may imply heteroscedasticity and result in inefficient estimates. However, the sample sizes are so large that it seems unnecessary to use a weighted least squares procedure to correct for the inefficiency of the OLS.

The R^2's for all four groups are substantially higher in the new metric than in the old metric. The new metric clearly performs better with the linear model using the conventional criterion of performance among sociologists--R^2. The better performance of the SAS/EDR metric with respect to the zero-order correlations could not be unambiguously credited to the metric, since the construction of EDR depends on labor force experience. This alternative interpretation does not exist here where labor force experience is entered as an indepedent variable. The R^2's produced by the new metric are in fact higher than the R^2's reported in status attainment research that include measures of family background. For white and black males they are higher than both the OCG I and OCG II R^2's in models that include five family-background variables and education (Featherman and Hauser, 1976b: Table 6), but not a measure of experience. They are also higher than the OCG II results for a model that includes age and age squared (Bielby, Hauser, and Featherman, 1977). Clearly then the misspecified vacancy competition model fits better than the human capital model, where education is measured in years of schooling and status in the arbitrary metric of SEI. Both the SAS and the EDR metric contribute to this result.

The metric coefficients to education show the same pattern in the two metrics when black males and females are compared to white males, and the results are consistent with those reported in the literature. However, the

new metric produces a difference in the status returns to education between white males and females that is not at all consistent with what the status attainment literature has suggested. In a widely cited paper, Treiman and Terrell (1975) state: "these data . . . address the feminist complaint that women must present higher qualifications than men to compete for equivalent jobs . . . we can see . . . that this is not at all the case for whites. For both males and females each year of education is worth something over two points in occupational prestige . . ." (182). Treiman and Terrell do not use SEI, but the scores constructed by Treiman, the independent variables, and the sample differ from this analysis. However, these differences are unimportant since the Treiman-Terrell conclusion can also be drawn from Table 2's results in the SEI/EDY metric. It seems impossible to argue in favor of the conventional metric as a more valid instrument for detecting sex inequality. Further, the sex differences observed using SAS/EDR metrics correspond to those found for earnings. Hence the feminists alluded to by Treiman and Terrell seem to have a valid complaint: White women have lower status returns to education than any other group.

The results regarding the effect of labor force experience illustrate the ambiguities in making inferences about change from cross-sectional data. For white males LFX and LFX^2 have the appropriate signs and magnitudes, given the assumed form of the experience attainment profiles. However, note that the standardized partial effect of education in the SEI/EDY metric is higher than the zero-order correlation. The reason is that EDY and LFX correlate quite highly ($r = .467$), reflecting the secular growth in educational attainments.[8] Hence if labor force experience is important

for attainment, and both human capital and vacancy competition theory imply that it is, models that do not include labor force experience--nearly all sociological models of status attainment--seriously bias the estimates of the effect of education on attainment when the conventional metric is used. The bias is not important in the SAS/EDR metric since educational attainments here are standardized by year of graduation.

Assuming that the measure of competitive advantage captured by EDR is the valid measure of educational attainment in attainment models, it can be argued that the substantial effect of experience observed in the SEI/EDY metric is upwardly biased. The reason is that LFX in the SEI/EDY metric captures some of the changing effect of levels of educational attainment measured in years of schooling, for example, the declining value of high school education. These problems of interpretation are not present in the appropriate SAS/EDR metric.

The effect of experience for white women and black males is insubstantial in both metrics. This seems to reflect a lack of careers for these groups, an issue explored in the next part of this section. The effect of experience is more substantial for black women, and negative. This seems to indicate a change in occupational opportunities for black women favoring young women. These secular changes in occupational opportunities presumably have also occurred in some degree for the other groups, biasing downward all estimates of the effect of labor force experience on attainment.

It could be argued that most of the differences produced by the metrics reside in the cohort standardization established for educational attainment, and that the distributional properties achieved by the SAS/EDR metric are unimportant. It is possible to directly test this assertion by estimating

the models in different LFX groups. This was done using five 10 year LFX groups. The R^2's in the SEI/EDY metric for the five groups are .35, .41, .34, .30, .21 and in the SAS/EDR metric .43, .43, .38, .34, .27. Since the model performs better in the SAS/EDR metric in each group, the results discussed above are not likely due to the standardization of educational attainments by LFX alone, but also reflect the other properties of the metrics.

The main problem with the results presented so far is that they do not identify the sources of the differences between the sex and race groups in terms of the forces that govern the attainment process: differences in opportunity structure, in overall resources for attainment, and in the contribution of specific resources, such as education, to the overall level of resources. Analysis using the vacancy model directly as specified in Equation 10 should be performed.

The Vacancy Competition Model

The linear model for the level of status, Equation 13, is, as mentioned, a misspecification of the outcome of the attainment process if governed by the vacancy competition model. It assumes equilibrium in the process and does not correctly specify the role of labor force experience in the attainment process. It nevertheless performed better in the metric justified by the vacancy competition model than in the conventional metric. However, even if the process had been in equilibrium in these cross-sectional data, the estimated coefficients d_i cannot identify the parameters that govern the attainment process according to the vacancy competition model. Direct analysis of change is needed for this task.

The PUS data allow for such analysis as the respondents were asked about their occupation in 1965 as well as in 1970.

The specification of the vacancy competition model is given in Equation 10. Differentiating Equation 10 shows directly how change in status is governed by the opportunity structure and a person's resources:

$$\frac{dy(t)}{dt} = a + by(t). \qquad (15)$$

Change is positively related to a person's resources, and, for given status and resources, the magnitude of b will determine the amount of change in such a manner that the closer b is to zero (as b is negative by assumption) the more growth in status will occur.

The quantity b was given earlier as $b = \beta/h$. The parameter β that governs the shape of the status distribution was set equal to -1 in the construction of the SAS metric. The parameter h measures the rate at which new vacancies occur that produce gains in status. If a group like blacks or women is being denied opportunities for gains in status, h will appear to be lower. This hypothesis is of major interest and is tested in the new and the conventional metrics below.

Earlier, I argued that a person's resources could be seen as being determined additively by specific resources (cf. Equation 11). The coefficients c_i measure the contribution of specific resources to z. These coefficients may vary across population groups, reflecting the unequal importance of specific resources like education for getting access to jobs in different labor markets. Having estimated the c_i coefficients and knowing the values of various specific resource variables, the overall level of resources, z, can be estimated and its distribution across population groups ascertained.

In the analysis of levels of status it was established that the status returns to education were lower for blacks than for whites. Estimation of the b and c_i parameters will make it possible to ascertain to what extent such differences are due to unequal opportunities for blacks and whites (either due to discrimination against blacks within a single market or to unequal allocation of blacks and whites to labor markets with unequal opportunity structures), and to what extent they reflect differences in the importance of education for blacks and whites.

The desired analysis can be performed substituting the expression for z given in Equation 11 in Equation 10. An apparent difficulty with Equation 10 is that this expression relates status at time t to status at entry into the labor force. However, it is easily shown, either by algebraic manipulations or by integrating Equation 15 over the appropriate time interval, that the expression holds for any time interval $t_2 - t_1$. Hence the parameters can be estimated using Equation 10 and substituting arbitrary time points t_1 and t_2 for 0 and t. Here, of course, $t_2 - t_1$ equals five years.

With the substitution of Equation 11 into Equation 10, the model can be written as

$$y(t_2) = c_0^* + b^* y(t_1) + \sum_i c_i^* x_i, \qquad (16)$$

where $b^* = e^{b\Delta t}$, $c_i^* = c_i/b(e^{b\Delta t} - 1)$ and $\Delta t = t_2 - t_1$. This is a lagged equation of a form often met in the analysis of longitudinal data. From estimates of b^* and the c_i^* parameters the fundamental parameters b and c_i are easily derived. The estimation of Equation 16 is done here using ordinary least squares, since only observations over one time interval are available.

It is well known that lagged models of this form produce estimation problems not well solved by OLS. Autocorrelation due to unmeasured variables that are positively correlated with the lagged variable will produce upward bias in b^*. Autocorrelation will also produce inefficient estimates. The latter is not a problem here, however, because of the very large sample size. The estimates of b^* and the c_i^* coefficients are given in Table 3 in the SEI/EDY metric and in the SAS/EDR metric.

If blacks are given fewer opportunities for gains in status than whites, b^* for blacks should be smaller than b^* for whites. This is not the case in the SEI metric, but the pattern is established in the SAS metric. Further, in the SEI metric the b^* for white women is greater than the b^* for men, indicating more opportunities for women in this metric. The intercept c_0^* can be interpreted to reflect unmeasured resource variables. Estimates of this quantity in the SEI metric are negative. This reflects the arbitrariness of this metric, but does not make much conceptual sense. In contrast, the quantities have the right signs in the SAS metric. The SAS/EDR metric that is justified by the model being estimated clearly produces the most meaningful results.

The differences in the b^* coefficients among the various groups may appear slight. These coefficients are, as mentioned, likely biased upward. It is know that error is greater in status attainment models estimated on blacks than on whites (Bielby, Hauser, and Featherman, 1977). Hence the upward bias should be greater for blacks than for whites. The differences in b*'s therefore are probably smaller than if better estimation techniques could have been applied--if observations on more than two points in time were available.

Table 3

Regression of 1970 Status on 1965 Status and Education in the SEI/EDY Metric and SAS/EDR Metric: White Men and Women and Black Men and Women, Aged 25-64 in 1970

(Metric coefficients)

	White Males		White Females		Black Males		Black Females	
	SEI	SAS	SEI	SAS	SEI	SAS	SEI	SAS
Status 1965 (SEI/SAS)	.766	.801	.776	.768	.762	.754	.759	.723
Education (EDY/EDR)	.991	.112	.974	.096	.619	.133	1.087	.162
Constant	-3.143	.112	-3.595	.132	-.628	.059	-6.294	.051
R^2	.724	.760	.714	.670	.652	.696	.724	.709
N	20761		9795		12541		9273	

The R^2's are uniformly high, which reflects the lagged form of the model. The model fits better in the SAS/EDR metric for both male groups. The R^2's are lower in the SAS/EDR metric for females. It is possible that this reflects the fact that the more accurate metric better detects the failure for women of the assumption of continuous employment made in the derivation of the vacancy competition model.

Substantive interpretation of these results should rely on the fundamental parameters rather than on the estimates given in Table 3, since these are estimates of quantities that are functions of time, the c_i's and b. The parameters that govern the process were therefore calculated solving the expressions for b^* and the c_i^*'s given above. The results are shown in Table 4. Table 4 relies only on the estimates obtained in the SAS/EDR metric.

In addition to estimates of b, of c_0, which measures unmeasured resources, and of c_1, which measures the contribution of education to a person's resources, Table 4 also presents other quantities of interest. The level of resources, z, is calculated using Equation 11 with the mean educational attainment (in EDR metric) for the various groups given in Table 2. The highest expected attainment for a group is given by y(m) calculated as $y(m) = -z/b$. Finally, for comparison with the regression results of Table 2, a quantity d_1 is presented calculated as $d_1 = -c_1/b$. This quantity measures the expected effect of education on level of status, when the person has achieved y(m) (cf. Equation 14).

Table 4 reveals a number of interesting results. The opportunity structure for women is less favorable than the opportunity structure for men. Blacks have fewer opportunities for gains in status than whites. The "effects" of race and sex are in fact additive so that the difference between men and

Table 4

Estimates of the Parameters of the Vacancy Competition Model Based on the Regression Results of Table 3 in the SAS/EDR Metric Together with Estimate of Overall Level of Resources, Predicted Highest Attainment, and Predicted Returns to Education in Equilibrium

	White Men	White Women	Black Men	Black Women
b	-.222	-.264	-.282	-.324
c_0	.125	.150	.068	.060
c_1	.125	.109	.152	.189
z	.267	.263	.157	.194
y(m)	1.203	.996	.557	.599
d_1	.563	.413	.539	.583

Note: Estimates of b, c_0, and c_1 are obtained in solving expressions for b^* and c_i^* given in the text. The parameter b is a measure of opportunity structure, c_0 is a measure of unmeasured resources, c_1 is a measure of contribution of education to resources, z is an estimate of level of resources, y(m) is the predicted highest attainment, and d_1 is the predicted highest returns to education.

women is the same for both races. This combines to produce the most unfavorable opportunities for status attainment for black women, and the most favorable for white males. Although it should surprise no one that white males have a more favorable position than any other group, it may seem surprising that black women are suffering the most severe employment discrimination. Black women are generally observed (including here, cf. Table 2) to have higher attainments than black men and higher observed returns to their education. The reason for their higher achievements can be seen from Table 4 to reside in their higher levels of resources, which compensates for less favorable opportunities.

The overall level of resources of blacks are lower than those of whites for both males and females. This is a result of lower levels of educational attainments, as shown in Table 2, and of lower levels of the unmeasured resources captured by c_0. The major omitted variables here are presumably measures of family background. Hence the results indicate that family background is a more important resource for whites than for blacks. In contrast, education is a more important resource for blacks than for whites, that is, education makes a more important contribution to the resources of blacks than to whites'. Blacks are more dependent on the competitive advantage conferred by their educational attainment for access to better jobs (that blacks less often get access to).

White women have about the same level of resources as white men. Their education is somewhat less important. On the other hand, unmeasured resources are more important.

The predicted y(m)'s give a pattern of inequality among these four groups that corresponds to the mean status levels observed in Table 2.[9] The difference

between white women and men is almost completely explained by white women having fewer opportunities for gains in status, whereas the race difference reflects the combined impact of fewer opportunities given to blacks and lower levels of resources. The predicted status returns to education (d_1) for the four groups correspond to the pattern found in Table 2, except that here black women have higher expected status returns to their education than the other groups, whereas in Table 2 they were only observed to have the next highest. Note that for white women few opportunities and less importance of education combine to produce the lowest status returns to education of all, in agreement with the finding of Table 2.

It should be noted that the predicted y(m) and d_1's need not correspond exactly to the results obtained in Table 2. Table 2's estimates are based on respondents for whom the process has not yet reached equilibrium. Further, the parameter estimates of Table 4 pertain to change in status realized over the 1965-1970 period. This was a period when the oportunity structure should have been favorable for all, and probably more favorable than in the preceding periods. The observed outcomes in Table 2 reflect the outcomes of attainment processes taking place in more unfavorable opportunity structures.[10]

6. CONCLUSION

This paper proposes a theory of the status attainment process (the vacancy competition model) and specifies it in a mathematical model of the attainment process. The theory justifies a new metric for status and for education attainments. Using this new metric, we analyze forces that govern the attainment process--opportunity structure and personal resources--for race

and sex groups. Pluasible results regarding differences by sex and by race in opportunities for status gains and in resources are established using the new metric. These results would not obtain in the conventional metric used in status attainment research. Further, the new metric performs better than the conventional metric, even in the conventional linear models for the level of status. In particular, it establishes that the attainment process for women indeed differs from the process for men, despite the impression created by status attainment research carried out in the conventional metric.

The vacancy competition model makes it possible to isolate the contribution of unequal opportunities and resources in producing unequal attainment among population groups. The model thus implements an old notion in social mobility research (dating back at least to Sorokin, 1927) of mobility being a question of individual and "structural" forces, a notion that however was never satisfactorily mirrored in models of mobility and attainment (Sørensen, 1975b). The model also provides a plausible alternative to the human capital/marginal productivity theory of attainments developed in economics. This economic theory is, as shown here, problematic as a theory of status attainment. In fact, the vacancy competition model might offer a more plausible theory of the earnings attainment process in the large sectors of the economy where earnings are attributes of jobs and not of persons. This question is being addressed in current research.

The vacancy competition model has been used in this paper to establish unequal opportunities for better jobs by sex and by race. However, the analysis has not addressed the question of how these differences in opportunity structure come about. They could result from discrimination

against sex and race minorities within a single labor market, or they could result from the unequal allocation of women and blacks to labor markets with different opportunity structures. Research using the vacancy competition model, with the appropriate metric, in different labor markets should clarify this ambiguity in the interpretation of the results of this paper.

NOTES

[1]Hamblin (1971) has constructed a measure of status based on ratings that is claimed to be a ratio level measure. I am unaware of examples of application of this metric in research on status attainment.

[2]A third approach is to use observed mobility to generate scores, on the assumption that distance moved reflects distance in status. Such efforts have been made (e.g., Blau and Duncan, 1967; Klatzky and Hodge, 1971; Featherman, Jones, and Hauser, 1975), but the resulting scores have never (to my knowledge) been taken to represent a serious alternative to the SEI or prestige scores.

[3]See Atkinson (1975) for a review of the "orthodox" theory.

[4]This conception of the role of education in attainment is similar to the ones presented by Boudon (1974), Thurow (1975), and Hirsch (1976).

[5]This specification suggests that a nonstationary Poisson process with this particular time dependence will govern the rate of job shifts. An empirical investigation using such a model is presented by Sørensen (1975a).

[6]As will be shown later, differentiating Equation 10 produces a simple linear differential equation of the type discussed by Coleman (1968).

[7]If only the ordinality of educational attainment measured in years of schooling was a concern, percentiles might seem an appropriate metric. This has been recently suggested by Lieberson (1978). However, using percentiles implies that the underlying variable--competitive advantage--is uniformly distributed, which seems difficult to justify. The exponential distribution corresponds to the structure of inequality assumed in the vacancy competition model.

[8]The correlation is for white males. For this group EDR and LFX correlate -.143. The correlation is not zero because the standardization of educational attainment by LFX is not linear in LFX, and because total population estimates and not only white males were used in the construction of EDR.

[9]The predicted y(m)'s are somewhat higher than the mean SAS observed in Table 2 because y(m) refers to the highest attainment.

[10]In particular, the secular change in the opportunity structure may explain why the predicted d_1 for black women is higher than the observed d_1. Substantial improvements in the opportunity structure for black women are reflected in the significant negative effect of LFX on level of status shown in Table 2.

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